TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P78

The possibility of water hammer in a liquid system is minimized by...

A. maintaining temperature above the saturation temperature.

B. starting centrifugal pumps with the casing vent valve fully open.

C. starting positive displacement pumps with the discharge valve closed.

D. venting systems prior to starting centrifugal pumps.

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P278

Which one of the following methods will increase the possibility and/or severity of water hammer?

A. Opening and closing system valves slowly

B. Venting fluid systems prior to starting a pump

C. Starting a centrifugal pump with the discharge valve fully open

D. Starting a centrifugal pump with the discharge valve fully closed

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P679 (B279)

A sudden stop of fluid flow in a piping system, due to rapid closure of an isolation valve, will most likely result in...

A. check valve slamming.

B. pump runout.

C. water hammer.

D. pressurized thermal shock.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P879

One reason for keeping condensate out of the steam lines is to...

A. minimize corrosion buildup.

B. reduce heat losses.

C. eliminate steam traps.

D. prevent water/steam hammer.

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P1079

The possibility of water hammer will be increased by...

A. maintaining the discharge line filled with liquid on an automatically starting pump.

B. condensation in a steam line just prior to initiating flow.

C. warming steam lines prior to initiating steam flow.

D. slowly closing the discharge valve on an operating pump.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P1279

To minimize the possibility of water hammer when initiating flow in a system, the operator should...

A. vent the system prior to initiating flow.

B. vent the system only after flow has been initiated.

C. fully open the pump discharge valve prior to starting a pump.

D. rapidly open the pump discharge valve after a pump is running.

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P1879 (B2779)

Which one of the following describes why large steam lines are gradually warmed instead of suddenly admitting full steam flow?

A. To minimize the possibility of stress corrosion cracking of the steam lines

B. To minimize the total thermal expansion of the steam lines

C. To minimize the potential for water hammer in the steam lines

D. To minimize the heat loss from the steam lines

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P2079 (B2081)

Which one of the following will minimize the possibility of water hammer?

A. Draining the discharge line of a centrifugal pump after shutdown

B. Draining condensate out of steam lines before and after initiating flow

C. Starting a centrifugal pump with its discharge valve fully open

D. Starting a positive displacement pump with its discharge valve partially closed

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P2279 (B2679)

Which one of the following operating practices minimizes the possibility of water hammer?

A. Change valve position as rapidly as possible.

B. Start a centrifugal pump with the discharge valve throttled.

C. Start a positive displacement pump with the discharge valve closed.

D. Vent a system only after initiating system flow.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.04 [3.4/3.6]
QID: P4042 (B4041)

Refer to the drawing of two lengths of 6-inch piping, each containing an identical automatic isolation valve. The actual pipe lengths are proportional to their symbols in the drawing

Water at 65°F is flowing at 1,000 gpm through each pipe. If the isolation valves suddenly and simultaneously close, valve A and its associated piping will experience a maximum pressure that is _____ the maximum pressure experienced by valve B and its associated piping. The pressure spike will dissipate quicker in the _____ length of pipe.

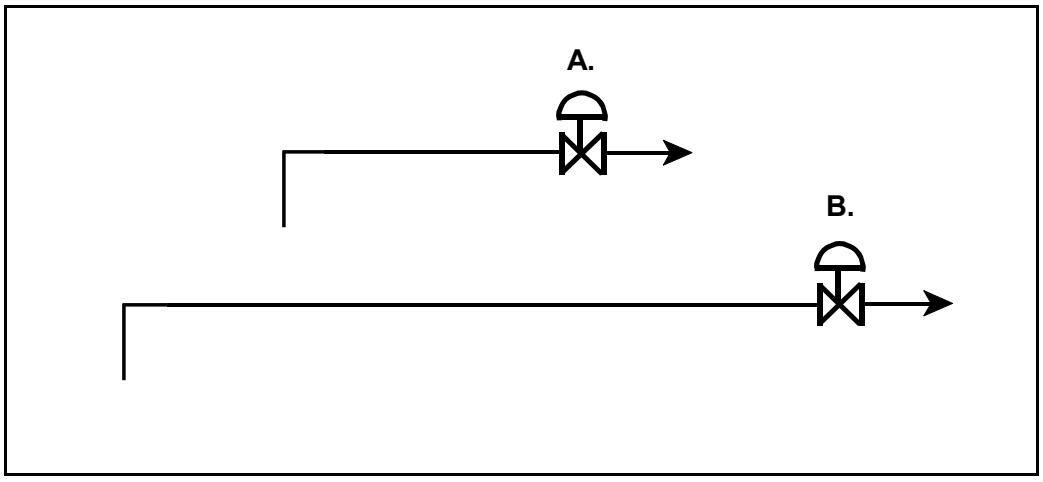
A. equal to; shorter

B. equal to; longer

C. less than; shorter

D less than; longer

ANSWER: A.



TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P380 (B383)

An 85 gpm leak has developed in a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?

A. 60.1 gpm

B. 51.7 gpm

C. 42.5 gpm

D. 33.3 gpm

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P579

Mass flow rate equals volumetric flow rate (V) times...

A. specific volume.

B. density.

C. specific gravity.

D. velocity.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P680 (B681)

A 55 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 50 psig?

A. 27.5 gpm

B. 31.8 gpm

C. 38.9 gpm

D. 43.4 gpm

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P1382

A 75 gpm leak to atmosphere has developed from a cooling water system that is operating at 80 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 40 psig?

A. 37.5 gpm

B. 43.5 gpm

C. 53 gpm

D. 59 gpm

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P1580 (B1979)

A 60 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 15.0 gpm

B. 30.0 gpm

C. 42.4 gpm

D. 53.1 gpm

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P1679 (B2981)

A 100 gpm leak to atmosphere has developed from a cooling water system that is operating at 60 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 20 psig?

A. 33.3 gpm

B. 53.0 gpm

C. 57.7 gpm

D. 70.7 gpm

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P1779 (B1783)

A 100 gpm leak to atmosphere has developed from a cooling water system that is operating at 45 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 30 psig?

A. 25 gpm

B. 50 gpm

C. 67 gpm

D. 82 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P1986

A 47 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 23.5 gpm

B. 33.2 gpm

C. 36.5 gpm

D. 37.3 gpm

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P2080 (B2080)

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 69 gpm

B. 60 gpm

C. 51 gpm

D. 40 gpm

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P2379 (B2381)

A 60 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 100 psig?

A. 27 gpm

B. 35 gpm

C. 40 gpm

D. 49 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P2779 (B2781)

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 20 gpm

B. 40 gpm

C. 49 gpm

D. 57 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P2980

An 80 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 100 psig?

A. 36 gpm

B. 53 gpm

C. 56 gpm

D. 65 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.06 [2.8/2.9]
QID: P580

Reactor coolant system (RCS) hot leg temperature is 568°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 1250 to 1201 psig

B. 1200 to 1151 psig

C. 1150 to 1101 psig

D. 1100 to 1051 psig

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.06 [2.8/2.9]
QID: P1180

Reactor coolant system (RCS) hot leg temperature is constant at 538°F while RCS pressure is decreasing due to a small reactor coolant leak. Which one of the following RCS pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 1100 to 1151 psig

B. 1050 to 1001 psig

C. 1000 to 951 psig

D. 950 to 901 psig

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.06 [2.8/2.9]
QID: P1480

Reactor coolant system (RCS) hot leg temperature is 520°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 950 to 901 psig

B. 900 to 851 psig

C. 850 to 801 psig

D. 800 to 751 psig

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.06 [2.8/2.9]
QID: P2581

Reactor coolant system (RCS) hot leg temperature is 552°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 1100 to 1051 psig

B. 1050 to 1001 psig

C. 1000 to 951 psig

D. 950 to 901 psig

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P3080 (B3181)

A 75 gpm leak to atmosphere has developed from a cooling water system that is operating at 100 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 80 psig?

A. 26.5 gpm

B. 38.9 gpm

C. 56.4 gpm

D. 67.1 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.05 [2.9/3.0]
QID: P3780 (B3789)

Which one of the following describes the relationship between the main steam mass flow rate leaving a steam generator and the main feedwater mass flow rate entering the same steam generator at steady-state power operation? (Assume no auxiliary addition/removal of steam generator inventory.)

A. The mass flow rates will be the same only if downcomer level is constant.

B. The mass flow rates will be the same only if the reactor is operating near rated power.

C. The main steam mass flow rate is smaller than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.

D. The main steam mass flow rate is greater than the main feedwater mass flow rate by the amount of moisture removed by the steam generator moisture separators.

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.07 [2.7/2.7]
QID: P581

A nuclear power plant is recovering from a loss of offsite power that caused all reactor coolant pumps (RCPs) to stop. Pressurizer level indication is off-scale high.

Which one of the following is most likely to occur if the steam generator (S/G) temperatures are 50°F higher than their associated reactor coolant system (RCS) loop temperatures when an RCP is restarted?

A. Localized water hammer in the RCS

B. Pressurized thermal shock to the S/Gs

C. A large pressure spike throughout the RCS

D. Inadvertent lifting of a S/G atmospheric relief valve

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.08 [2.8/1.8]
QID: P279 (B143)

A centrifugal water pump is being returned to service after maintenance. However, the operator fails to vent the pump.

Compared to normal operations, after the pump is started, the operator will see _____ flow rate and _____ discharge head.

A. higher; lower

B. higher; higher

C. lower; lower

D. lower; higher

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.08 [2.5/2.6]
QID: P2923 (B3579)

Refer to the drawing of four centrifugal pump operating curves (see figure below).

A two-speed centrifugal pump is operating at fast speed in a cooling water system and discharging through a heat exchanger. The pump is then switched to slow speed.

Which set of curves illustrates the initial and final pump operating conditions?

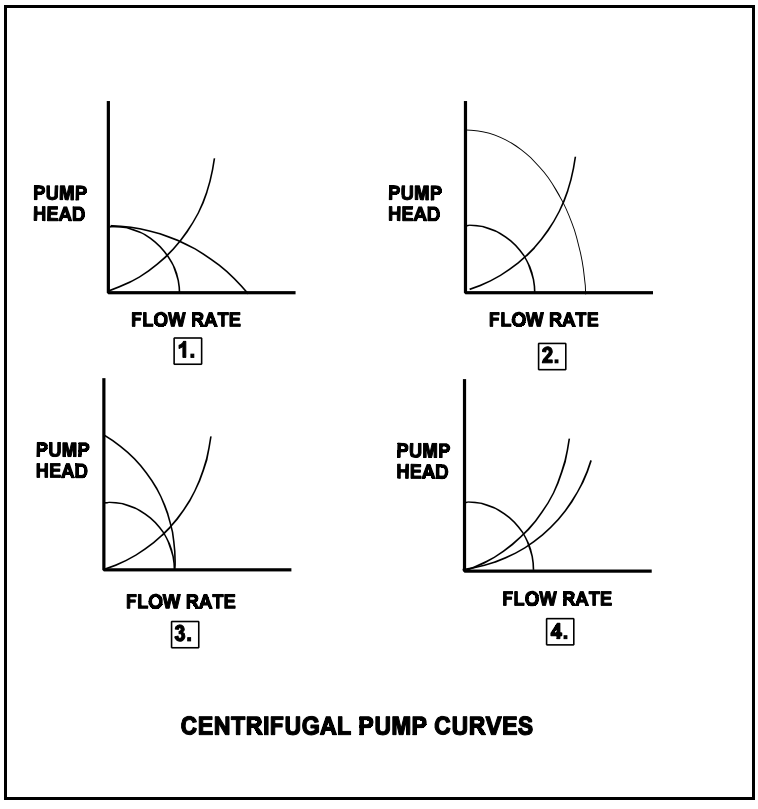
A. 1.

B. 2.

C. 3.

D. 4.

ANSWER: B.



TOPIC: 193006
KNOWLEDGE: K1.08 [2.8/2.8]
QID: P3481

Refer to the drawing of a cooling water system (see figure below).

The centrifugal pump is circulating water at 100°F. Which one of the following will cause the centrifugal pump to operate closer to a condition in which gas/vapor binding can occur?

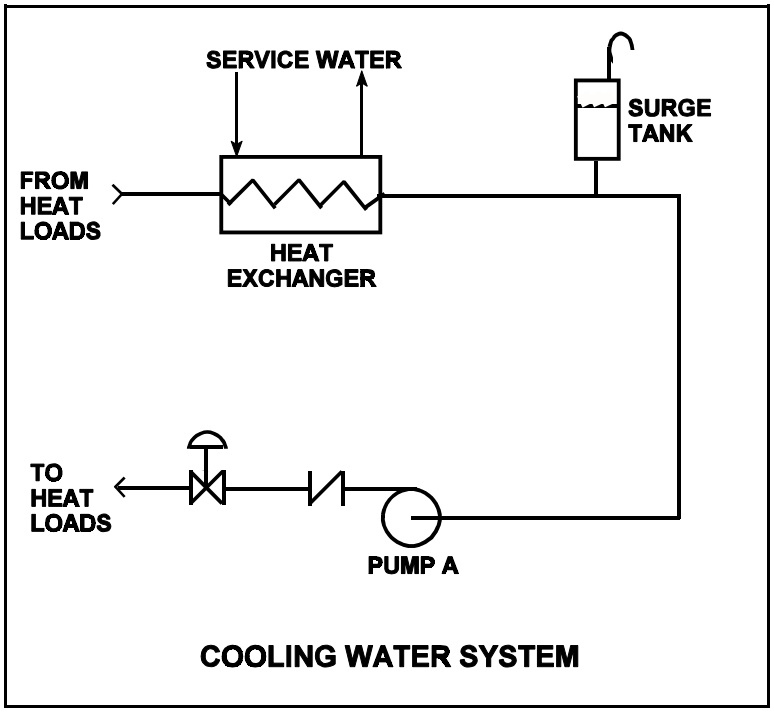
A. Surge tank level is raised by 5%.

B. Service water flow rate is decreased by 5%.

C. The pump discharge valve is used to decrease cooling water system flow rate by 5%.

D. Makeup water containing a high concentration of total dissolved solids is added to the cooling water system.

ANSWER: B.



TOPIC: 193006
KNOWLEDGE: K1.07 [2.5/2.6]
QID: P3525 (B1680)

An ideal positive displacement pump is pumping to a system operating at 100 psig. Assume pump speed is constant, zero pump slip, and pump backpressure remains within normal pump operating limits.

If system pressure increases to 200 psig, the pump head will _____ and pump flow rate will _____.

A. increase; remain the same

B. increase; decrease

C. remain the same; remain the same

D. remain the same; decrease

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.10 [3.3/3.4]
QID: P80 (B79)

The piping system pressure change caused by suddenly stopping fluid flow is referred to as...

A. cavitation.

B. shutoff head.

C. water hammer.

D. flow head.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.10 [3.3/3.4]
QID: P381 (B380)

The major concern with starting a main feedwater pump with downstream fluid in a saturated condition is...

A. cavitation.

B. water hammer.

C. thermal shock.

D. positive reactivity addition.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.10 [3.3/3.4]
QID: P2480 (B1180)

Which one of the following will increase the possibility of water hammer?

A. Opening and closing system valves very slowly

B. Venting liquid systems only after initiating system flow

C. Starting centrifugal pumps with the discharge valve closed

D. Starting positive displacement pumps with the discharge valve open

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.10 [3.3/3.4]
QID: P2880 (B1135)

The primary reason for slowly opening the discharge valves of large motor-driven centrifugal cooling water pumps after starting the pumps is to minimize the...

A. net positive suction head requirements.

B. potential for a water hammer.

C. motor running current requirements.

D. potential for pump cavitation.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P79

Cavitation in an operating pump may be caused by...

A. lowering the pump suction temperature.

B. throttling the pump suction valve.

C. increasing the pump backpressure.

D. increasing the pump suction pressure.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P149

Cavitation of a centrifugal pump in an open system is indicated by _____ discharge pressure and _____ flow rate.

A. low; low

B. high; high

C. low; high

D. high; low

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P382 (B80)

The condition that would most likely cause cavitation of an operating centrifugal pump is...

A. lowering the suction temperature.

B. throttling the pump suction valve.

C. throttling the pump discharge valve.

D. decreasing the pump speed.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P481

While on surveillance rounds, an operator notices that a centrifugal pump is making a great deal of noise (like marbles rattling inside the pump casing) and the discharge pressure is fluctuating.

This set of conditions indicates pump...

A. runout.

B. cavitation.

C. bearing deterioration.

D. packing deterioration.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P882

Cavitation in an operating centrifugal pump may be caused by...

A. decreasing the pump suction temperature.

B. throttling down on the pump suction valve.

C. throttling down on the pump discharge valve.

D. decreasing the pump speed.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P1181

Which one of the following contains indications of cavitation?

A. Abnormally low discharge pressure and flow rate

B. Abnormally high discharge pressure and flow rate

C. Abnormally low discharge pressure and abnormally high flow rate

D. Abnormally high discharge pressure and abnormally low flow rate

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P1381

Cavitation is the formation of vapor bubbles in the _____ of a pump and the subsequent collapse of these bubbles in the pump _____.

A. impeller; casing

B. impeller; discharge piping

C. volute; casing

D. volute; discharge piping

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P1482

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

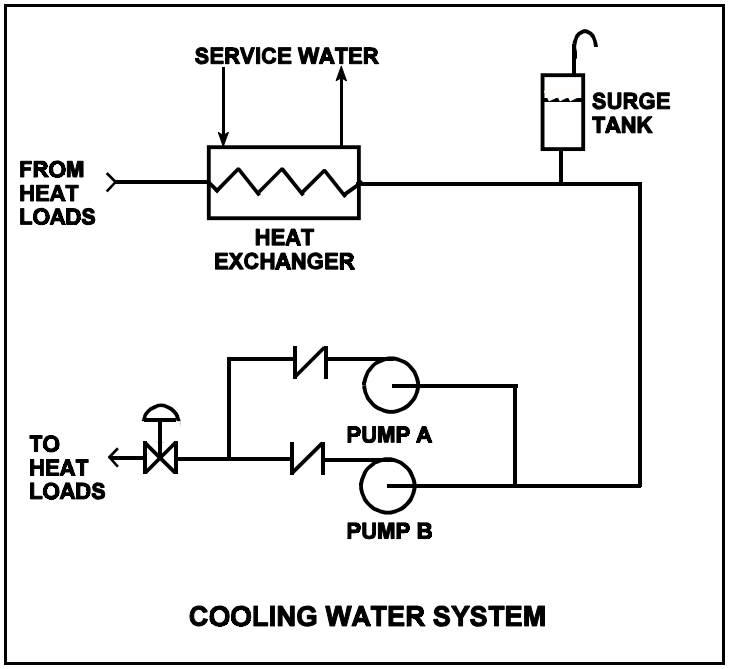
A. Starting pump B

B. Positioning the discharge valve to 75% open

C. Lowering the water level in the surge tank by 2 feet

D. Increasing heat exchanger service water flowrate by 10%

ANSWER: D.



TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P1582 (B2680)

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

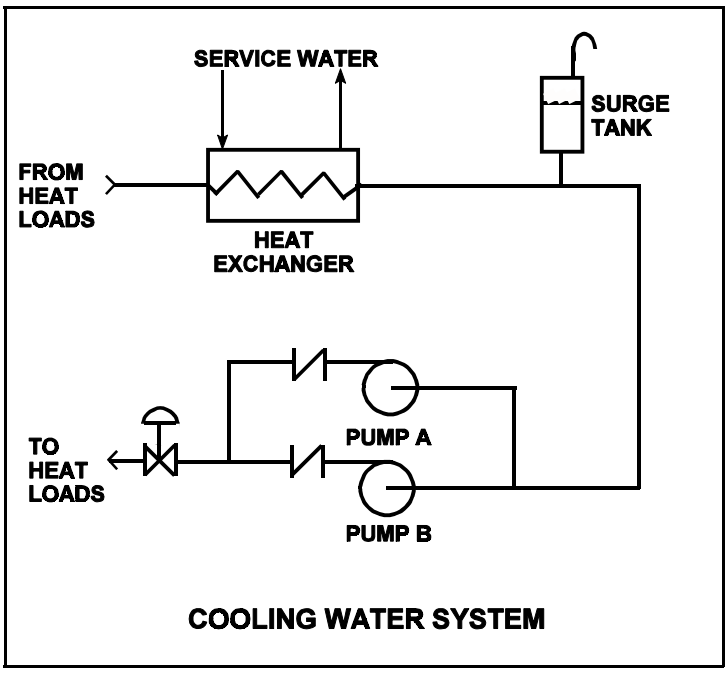
A. Starting pump B

B. Positioning the discharge valve to 75% open

C. Raising the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: C.



TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P1783

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

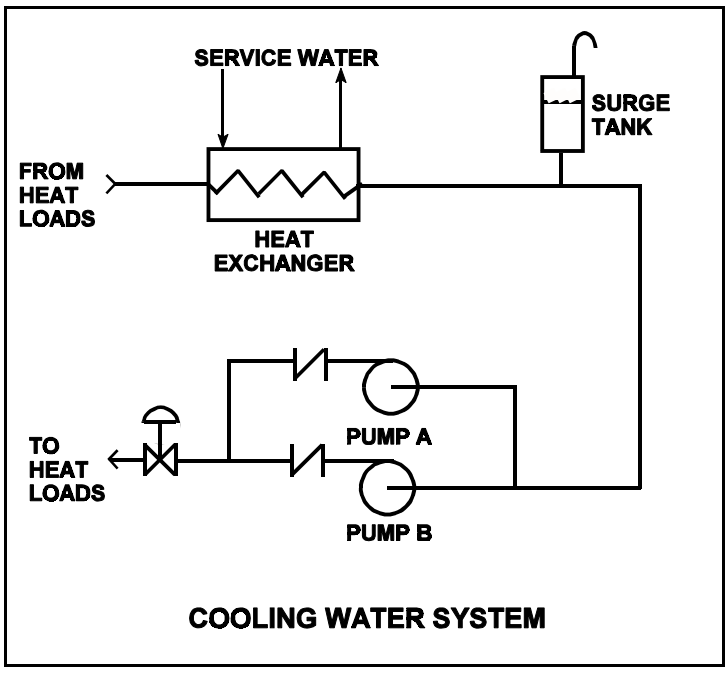
A. Starting pump B

B. Positioning the discharge valve to 40% open

C. Lowering the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: B.



TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P2181

Refer to the drawing of a cooling water system in which only pump A is operating and the pump discharge valve is currently 50% open (see figure below).

Which one of the following will cause pump A to operate closer to the conditions that will cause cavitation?

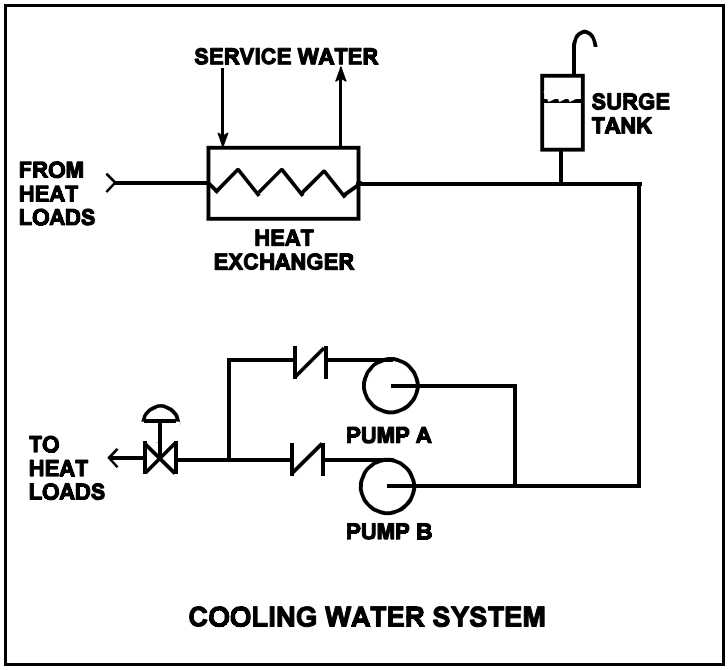
A. Starting pump B

B. Positioning the discharge valve to 40% open

C. Raising the water level in the surge tank by 2 feet

D. Increasing heat exchanger service water flow rate by 10%

ANSWER: A.



TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P2380

Refer to the drawing of a cooling water system in which both centrifugal pumps A and B are operating and the pump discharge valve is currently 50% open (see figure below).

If pump A is cavitating, which one of the following will reduce or eliminate cavitation in pump A?

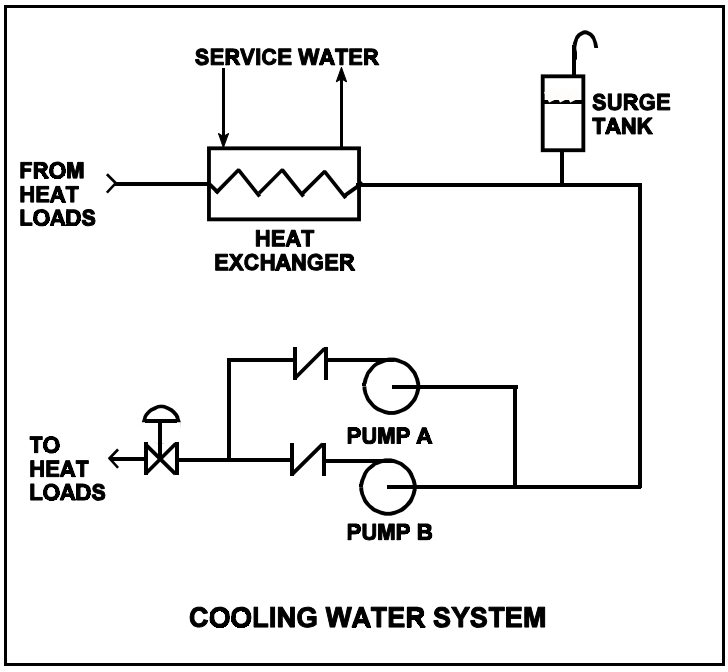
A. Stopping pump B

B. Positioning the discharge valve to 75% open

C. Lowering the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: A.



TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P2680 (B280)

Cavitation is the formation of vapor bubbles in the _____ pressure area of a pump followed by the _____ of these bubbles within the pump casing.

A. low; expansion

B. low; collapse

C. high; expansion

D. high; collapse

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P2881

Refer to the drawing of a cooling water system in which both pumps A and B are operating and the pump discharge valve is currently 50% open (see figure below).

Which one of the following will cause pump A to operate closer to the conditions that will cause cavitation?

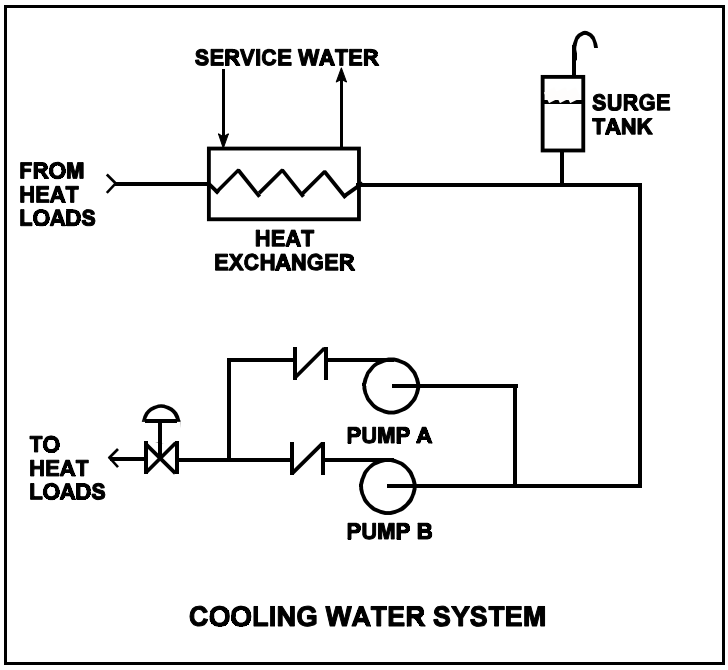
A. Stopping pump B

B. Positioning the discharge valve to 40% open

C. Raising the water level in the surge tank by 2 feet

D. Decreasing heat exchanger service water flow rate by 10%

ANSWER: D.



TOPIC: 193006
KNOWLEDGE: K1.11 [3.1/3.3]
QID: P2981 (B1880)

Which of the following completes the following statement?

Pump cavitation occurs when vapor bubbles are formed at the eye of a pump impeller...

A. because the localized flow velocity exceeds sonic velocity for the existing fluid temperature.

B. because the localized pressure exceeds the vapor pressure for the existing fluid temperature.

C. and enter a high pressure region of the pump where they collapse causing damaging pressure pulsations.

D. and are discharged from the pump where they expand into larger bubbles causing damaging pressure pulsations.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P81

In an operating cooling water system with a constant water velocity, if water temperature decreases, indicated volumetric flow rate (gpm) will...

A. remain the same, because the density of the water has not changed.

B. increase, because the density of the water has increased.

C. remain the same, because the water velocity has not changed.

D. increase, because the viscosity of the water has increased.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P281

Flow instruments used to measure the mass flow rate of saturated steam are often density compensated because, for a steam pressure increase at a constant volumetric flow rate, steam density will
_____ and the actual mass flow rate will _____.

A. decrease; increase

B. increase; decrease

C. increase; increase

D. decrease; decrease

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P982

A density-compensated flow instrument is being used to measure mass flow rate in a steam system. If the pressure of the steam decreases, indicated mass flow rate will: (Assume volumetric flow rate is constant.)

A. increase for all steam conditions.

B. decrease for all steam conditions.

C. increase, but only if the steam is saturated (not superheated).

D. decrease, but only if the steam is saturated (not superheated).

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P1083

A steam generator transient causes main steam pressure to decrease although the actual steam mass flow rate to the main turbine remains constant. If the main steam flow instrument is not density compensated, indicated steam mass flow rate will...

A. increase due to the velocity increase of the steam.

B. increase due to the increased density of the steam.

C. decrease due to the velocity decrease of the steam.

D. decrease due to the decreased density of the steam.

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P1182

A cooling water system is supplying 1.0 x $10^6$ lbm/hour of flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the mass flow rate that will be supplied by the system if cooling water temperature increases to 140°F?

A. 7.5 x $10^5$ lbm/hr

B. 8.3 x $10^5$ lbm/hr

C. 9.0 x $10^5$ lbm/hr

D. 9.9 x $10^5$ lbm/hr

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P1780

A reactor coolant system is supplying 1.0 x $10^8$ lbm/hour of coolant flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the mass flow rate that will be supplied by the system if cooling water temperature increases to 400°F?

A. 1.16 x $10^8$ lbm/hr

B. 1.09 x $10^8$ lbm/hr

C. 9.17 x $10^7$ lbm/hr

D. 8.65 x $10^7$ lbm/hr

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P2182

A reactor coolant system is supplying 1.0 x $10^8$ lbm/hr of coolant flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the approximate mass flow rate that will be supplied by the system if coolant temperature increases to 500°F?

A. 1.21 x $10^8$ lbm/hr

B. 1.13 x $10^8$ lbm/hr

C. 8.7 x $10^7$ lbm/hr

D. 7.9 x $10^7$ lbm/hr

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P2681

A cooling water system is supplying 2,000 lbm/min coolant flow at a temperature of 100°F. Assuming volumetric flow rate does not change, which one of the following is the approximate mass flow rate that will be supplied by the system if cooling water temperature increases to 140°F?

A. 1,964 lbm/min

B. 1,980 lbm/min

C. 2,020 lbm/min

D. 2,036 lbm/min

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P2882

A steam generator transient causes main steam pressure to increase although the actual steam mass flow rate to the main turbine remains constant. If the main steam flow instrument is not density compensated, the increased main steam pressure will cause indicated steam mass flow rate to...

A. increase due to the velocity increase of the steam.

B. increase due to the increased density of the steam.

C. decrease due to the velocity decrease of the steam.

D. decrease due to the decreased density of the steam.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P3081 (B3032)

The volumetric flow rate of cooling water entering a heat exchanger is 500 gpm.

Given the following:

Cooling water pressure entering and leaving the heat exchanger is 10 psig.
Cooling water inlet temperature is 90°F.
Cooling water outlet temperature is 160°F.
Heat exchanger inlet and outlet piping have the same diameter.

What is the approximate volumetric flow rate of the cooling water exiting the heat exchanger?

A. 496 gpm

B. 500 gpm

C. 504 gpm

D. 509 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.12 [2.5/2.6]
QID: P3783 (B3733)

A condensate pump is taking suction on a main condenser hotwell, containing water at 100°F, and discharging the water at a volumetric flow rate of 100,000 gpm to the main feedwater system. The main feedwater system heats the water to 400°F before it enters the steam generators. Assume there is no leakage, and no bypass or recirculation flow paths are in use.

What is the approximate volumetric flow rate of the feedwater entering the steam generators?

A. 100,000 gpm

B. 105,000 gpm

C. 109,000 gpm

D. 116,000 gpm

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P147

Operating two pumps in parallel instead of operating a single pump will result in a...

A. large increase in system head and a small increase in flow rate.

B. small increase in system head and a small increase in flow rate.

C. small increase in system head and a large increase in flow rate.

D. large increase in system head and a large increase in flow rate.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P280

The major effect of starting a second centrifugal pump in parallel with an operating centrifugal pump in an open system is increased...

A. system pressure.

B. system flow rate.

C. pump discharge pressure.

D. pump flow rate.

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P282

To decrease the flow rate through an operating positive displacement pump, an operator should...

A. throttle the pump discharge valve partially closed.

B. throttle the pump suction valve partially closed.

C. decrease the pump net positive suction head.

D. decrease the pump speed.

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P981

Which one of the following will <u>decrease</u> the head loss experienced in an operating cooling water system?

A. Starting a second pump in parallel with the operating pump

B. Shifting two heat exchangers from parallel to series operation

C. Replacing a 10 foot section of 10-inch diameter pipe with a 20 foot section of 10-inch diameter pipe

D. Replacing a 20 foot section of 10-inch diameter pipe with a 20 foot section of 12-inch diameter pipe

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P1282

Two centrifugal pumps and two positive displacement pumps are able to be cross connected to provide flow in a system. Each pump will produce 100 gpm at 1000 psig and each pump has a design maximum pressure of 1500 psig.

If system pressure is 1200 psig, which one of the following will produce the greatest system flow rate?

A. Two positive displacement pumps in series

B. Two positive displacement pumps in parallel

C. Two centrifugal pumps in series

D. Two centrifugal pumps in parallel

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P1683

Two centrifugal pumps and two positive displacement pumps are able to be cross-connected to provide makeup water flow to a system. Each pump will produce 100 gpm at 1000 psig backpressure and has a maximum design pressure of 1500 psig.

If system pressure is 800 psig, which one of the following combinations will produce the greatest flow rate to the system?

A. Two centrifugal pumps in parallel

B. Two centrifugal pumps in series

C. Two positive displacement pumps in parallel

D. Two positive displacement pumps in series

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P1784 (B1725)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1000 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1500 psig
Maximum design pressure: 2000 psig

Positive Displacement Pumps

Maximum design pressure: 2000 psig

Which one of the following pump configurations will supply the lowest makeup flow rate to the cooling water system if system pressure is at 1700 psig?

A. One PDP and one CP in series (CP supplying PDP)

B. One PDP and one CP in parallel

C. Two CPs in series

D. Two CPs in parallel

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P1979

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1000 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1500 psig
Maximum design pressure: 2000 psig

Positive Displacement Pumps

Maximum design pressure: 2000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the system if system pressure is at 800 psig?

A. One PDP and one CP in series (CP supplying PDP)

B. One PDP and one CP in parallel

C. Two CPs in series

D. Two CPs in parallel

ANSWER: D.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P2282 (B2281)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 4-inch diameter pipe and an 8-inch diameter pipe. Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 4-inch and 8-inch diameter pipes?

| | 4-inch Pipe (lbm/sec) | 8-inch Pipe (lbm/sec) |
|---|---|---|
| A. | 20 | 80 |
| B. | 25 | 75 |
| C. | 30 | 70 |
| D. | 33 | 67 |

ANSWER: A.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P2383 (B2324)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1200 psig.

Given the following information:

Centrifugal Pumps

Shutoff head: 1500 psig
Maximum design pressure: 2000 psig

Positive Displacement Pumps

Maximum design pressure: 2000 psig

Which one of the following pump configurations will supply the highest makeup flow rate to the system if system pressure is at 500 psig?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One PDP and one CP in series (CP supplying PDP)

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P2481 (2479)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 3-inch diameter pipe and a 6-inch diameter pipe. Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 3-inch and 6-inch diameter pipes? (Assume fluid velocity is the same in each pipe.)

| | 3-inch Pipe (lbm/sec) | 6-inch Pipe (lbm/sec) |
|---|---|---|
| A. | 10 | 90 |
| B. | 20 | 80 |
| C. | 25 | 75 |
| D. | 33 | 67 |

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P2582 (B2581)

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 6-inch diameter pipe and an 8-inch diameter pipe.

Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 6-inch and 8-inch diameter pipes? (Assume fluid velocity is the same in each pipe.)

| | 6-inch Pipe (lbm/sec) | 8-inch Pipe (lbm/sec) |
|---|---|---|
| A. | 24 | 76 |
| B. | 32 | 68 |
| C. | 36 | 64 |
| D. | 40 | 60 |

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P2783 (B2723)

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1200 psig.

Given the following information:

Centrifugal Pumps

| | |
|---|---|
| Shutoff head: | 1500 psig |
| Maximum design pressure: | 2000 psig |
| Flow rate with no backpressure: | 180 gpm |

Positive Displacement Pumps

| | |
|---|---|
| Maximum design pressure: | 2000 psig |

Which one of the following pump configurations will supply the highest makeup flow rate to the cooling water system if system pressure is at 1700 psig?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One PDP and one CP in series (CP supplying PDP)

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P3183

A four-loop nuclear power plant uses four identical reactor coolant pumps (RCPs) to supply reactor coolant flow through the reactor vessel. The plant is currently operating at 20% power with all RCPs in operation.

Which one of the following describes the stable RCS flow rate through the reactor vessel following the trip of one RCP? (Assume that no operator actions are taken and the reactor does not scram.)

A. Less than 75% of the original flow rate.

B. Exactly 75% of the original flow rate.

C. Greater than 75% of the original flow rate.

D. Unpredictable without pump curves for the RCPs.

ANSWER: C.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P3582

A reactor shutdown has been performed because of a leak from the reactor coolant system (RCS) to a steam generator (SG) via a tube leak.

Given the following initial conditions:

SG pressure is 1,000 psia.
RCS pressure is 2,200 psia.
RCS average temperature is 500°F.
Leak rate from the RCS to the SG is 100 gpm.

If RCS pressure is decreased to 1,600 psia, with no other changes in plant parameters, what will be the approximate leak rate from the RCS to the SG?

A. 50 gpm

B. 71 gpm

C. 79 gpm

D. 85 gpm

ANSWER: B.

TOPIC: 193006
KNOWLEDGE: K1.15 [3.1/3.3]
QID: P3683 (B3681)

Two identical single-speed centrifugal pumps (CPs) and two identical single-speed positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,200 psig.

Given the following information:

Centrifugal Pumps

| | |
|---|---|
| Discharge pressure at shutoff head: | 1,500 psig |
| Maximum design pressure: | 2,000 psig |
| Flow rate with no backpressure: | 180 gpm |

Positive Displacement Pumps

| | |
|---|---|
| Maximum design pressure: | 2,000 psig |

Which one of the following makeup water pump configurations will supply the highest initial flow rate to a cooling water system that is drained and depressurized?

A. Two CPs in series

B. Two CPs in parallel

C. Two PDPs in parallel

D. One PDP and one CP in series (CP supplying PDP)

ANSWER: B.